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ABSTRACT

Several strategies are presented that have been used in computer-literacy courses and been found to be successful for reducing computer anxiety and increasing computer confidence in preservice teachers: (1) give them an overview; (2) speak in their language; (3) find the friendliest computer system; (4) have them play; (5) make the computer fit them; (6) look under the hood to see what makes it tick; (7) give them a tour of the system; (8) tell them how it works; (9) start with simplicity and success; (10) teach self-regulated learning strategies; (11) use cooperative learning strategies; (12) keep their hands on the wheel; (13) let them know what computers can't do; (14) make their professional lives easier; (15) make their personal lives easier; (16) introduce them to the whole gang (different formats and software); (17) teach for both the artist and the scientist; (18) use the computer for quizzing; (19) take a drive along the information highway; (20) provide peers as lab assistants; (21) bring in the kids; and (22) teach them when to use technology, not as an end in itself, but to enhance curriculum. (Contains 18 references.) (SLD)

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Preservice Teachers and Computers: Strategies for Reducing Anxiety and Increasing Confidence

Paper presented at the annual conference of the
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Preservice Teachers and Computers:
Strategies for Reducing Anxiety and Increasing Confidence

Anthony A. Piña and Bruce R. Harris

Introduction

At a recent meeting with a group of college educators and administrators, one of the authors of this paper was asked the following question: "What do you foresee as the first major problem in getting non-computer literate faculty to use new technologies in the classroom?" The response was: "If we do not address the issue of computer anxiety and lack of computer confidence at the beginning, all of our other efforts to implement a technology integration plan will be in jeopardy." It is upon this premise that we have written this paper.

Technology integration

As educational technologists and teacher educators, we are now facing a time in which we may make a great difference in the future of educational systems and practices. The integration of new technologies into the teaching and learning process is one of the most talked about topics in the field of education. Many statewide educational initiatives are focusing upon the topic of technology (Fawson, 1992). Most talk of school "restructuring" includes, either implicitly or explicitly, the infusion of instructional technology processes and products (Reiser & Salisbury, 1991).

Many states now require that teachers receive educational technology training as part of their initial certification. As a consequence, we are facing a growing number of preservice teacher education students who are enrolling in our "computers in education" and other educational technology courses.

We were intrigued by the fact that so many of our students were waiting until their

final semester prior to graduation before enrolling in our courses. Informal interviews with our students revealed a widespread amount of anxiety about computers and a lack of confidence in their perceived ability to use computers for educational purposes.

We recognize that positive attitudes of teachers and administrators toward computers is vital to the successful implementation of new technologies into the classroom (Stevens, 1982). Students will be much more likely to use computers and other technologies if their teachers can be positive and competent role models (Bandura, 1977). The purpose for this paper to is to present several strategies that we have utilized in computer literacy courses and have found [illegible]ful for reducing computer anxiety and increasing computer confidence in preservice teachers.

Teacher attitudes toward computers

Many teachers do not feel prepared to use new technologies and resist the integration of computers and other technologies into their instruction (Heinich, 1991). Cambre and Cook reported that teachers in their study had higher levels of anxiety regarding the use of computers than students (Cambre and Cook, 1985).

Computer anxiety has been described by Cambre and Cook (1987) as "the fear of using computers as measured by physiological changes or responses on self-report instruments." They feel that computer anxiety is viewed best as a temporary state, rather than a permanent trait. As such, it should be susceptible to change.

Studying computer anxiety and confidence

Although a number of studies have documented computer anxiety in preservice (Savenye, Davidson & Orr, 1992) and inservice teachers (Madsen & Sebastiani, 1987),

applying these studies into the practice of teacher education presents us with some problems. Much of the research into the phenomenon of computer anxiety has produced inconclusive results as to the interaction between computer anxiety and age or gender. Cambre and Cook (1987), for instance, found significantly higher anxiety in females than in males. Older learners were also found to possess a higher degree of anxiety than younger learners. In the same year, however, Honeyman & White (1987) reported in their study of teachers and educational administrators that job title, gender, and age did not significantly affect computer anxiety.

Another problem is the prior experience that preservice teachers may have had with computers. Bitter & Davis (1985) report that preservice teachers are entering computer literacy courses with ever increasing prior experience. Although this may seem to be a positive trend, we have found that many students were introduced to computers through programming classes while in high school (Piña & Savenye, 1992). This experience often had the effect of leaving the impression that computers were only for programmers. Thus, prior experience may actually have had the effect of increasing computer anxiety. A third problem is that few studies provide specific recommendations or guidance for teacher educators who wish to incorporate strategies in their courses to change student attitudes toward computers.

Preservice teacher education

Many states now require an educational technology component in the training of preservice teachers. This component most often takes the form of a basic applications or "computers in education" course. Savenye and her colleagues found that participants in a

computer applications course for preservice teachers experienced statistically significant changes in computer anxiety and confidence in learning about and using computers (Savenye, 1993; Savenye, Davidson & Orr, 1992).

Technology integration programs that do not address the issue of alleviating computer anxiety and increasing teacher confidence in using computers, may face a great stumbling block in either overt or covert resistance from teachers. The teachers' preservice training can play a crucial role in developing positive teacher attitudes toward technology.

Strategies for Reducing Anxiety and Increasing Confidence

We agree with the statement that "A vital ingredient to reducing anxiety as newcomers begin to use computers is the method by which they are initiated" (Banks & Havice, 1989). We have utilized the following strategies in courses and workshops for preservice and inservice teachers at colleges and universities. These strategies have been successful in reducing anxiety and increasing confidence, according to course evaluations and interviews with students who have taken the courses (Piña & Harris, 1993; Piña & Savenye, 1992).

Strategy 1: Give them an overview.

On the first day of class, we give students a brief overview of the types of projects that they will be completing during the course. We stress the fact that they will be producing programs and materials that will enhance both their personal and professional lives. This strategy provides answers to three common questions from our students: a) "Why is this class relevant for me?" b) "What will I be doing in the class?" and c) "Do I have to be a programmer or 'techno-whiz' to use computers in my teaching?"

Strategy 2: Speak in their language.

Many of our students are intimidated by the jargon of computer technology. It has become necessary for us to become "bilingual," and translate high-tech terminology into "plain English" terms and applications.

Strategy 3: Find the friendliest computer.

In those instances when we have a choice of multiple platforms, such as MS-DOS, Windows, Macintosh, Apple II, Amiga, or others, we have our students begin their computer experience on the most intuitive and user friendly system available. In our experience, the Macintosh tends to be the easiest and least intimidating system for new users. In the absence of Macintosh computers, we will start students on Microsoft Windows programs.

Strategy 4: Have them play.

Some of our students believe that they will somehow cause the computer to self-destruct by pushing the wrong button. We encourage our students to play with the computers and push all of the buttons to see what they do. We assure students that almost any undesirable outcome from pushing one button can be corrected by pushing another button.

Strategy 5: Make the computer fit them.

We teach our students how to operate the computer's control panel to alter the way their computer screens look and act. This helps the students to realize that they actually control the computer, not the other way around.

Strategy 6: Look under the hood and see what makes it tick.

In order to remove some of the "mystery" of the computer we bring in a system that

is being repaired and take off the outer cover. The students are given the opportunity to see and touch some of the inner components, such as the motherboard, chips, cards, power supply and disk drives. We remove the outer case of hard drive and demonstrate how the disk drives read information from the floppy and hard disks. We explain to the students that disk drives function similarly to cassette recorders, something with which they are all familiar.

Strategy 7: Give them a tour.

We begin our first class unit with a software program that gives a short tour of the computer system. These programs are very structured, simple to follow, and require little help or guidance by the instructor. Students can complete a computer task successfully and see a good example of how the computer can be used to deliver instruction.

Strategy 8: Tell them how it works.

We attempt to "humanize" the computer, to an extent, by drawing correlates with human experiences. For example, we compare input devices with human sensory mechanisms, central processing units with brain functions and output devices with bodily movement, speech and other actions. This tends to make it easier for students to understand how computers operate.

Strategy 9: Start with simplicity and success.

Our assignments are structured so that the students progress from simple tasks to more complex tasks. Banks and Havice (1989) stress the fact that learning activities must be designed to insure a high degree of initial success, in order to immunize learners from acquiring learned helplessness. The first assignments are very short, step-by-step, and easy

to complete without much chance for failure or the necessity of help from lab assistants.

After completing the initial structured assignments, the students are required to apply the skills that they have learned to develop a novel, creative document or product. The complex assignments present enough ambiguity so that students will have to use and develop self-regulation and other higher order learning strategies; however, they are not so ambiguous that students' frustration level will hinder their motivation and success.

Strategy 10: Teach self-regulated learning strategies.

We teach the students to utilize self-regulation for solving problems and concerns which may arise (Lindner & Harris, 1992; Lindner & Harris, 1993). We have them complete an assignment in which we teach them how to use a user manual; afterwards, they are given a project where they must refer to the manual for help. Students are not allowed to ask a lab assistant or instructor for help until they first try to determine the answer from the manual.

Strategy 11: Use cooperative learning strategies.

We assign students to work in pairs as they complete an assignment. Each student must complete the assignment on his or her own computer, but only one assignment packet is given to each pair of students. This encourages the use of peer tutoring and other cooperative strategies.

Strategy 12: Keep their hands on the wheel.

Honeyman and White (1987) found that significant change in computer anxiety occurred after approximately 30 hours of hands-on exposure to computers. We focus our computer applications curriculum on hands-on, computer-based activities, rather than relying

primarily upon abstract lectures.

Strategy 13: Let them know what computers can't do.

We stress the concept that instructional software is not intended to replace the teacher, but can be used to supplement and enhance teacher-based instruction. We demonstrate that most of the tutorials available in the lab cannot carry the full burden of instruction and need to be integrated at the right time and place within the teacher's lesson plan.

Strategy 14: Make their professional lives easier.

We assign our students a tedious task to do by hand, such as computing grades, and then show them how the computer can perform the same task in seconds. This demonstrates to the students that the front end time that they spend learning computers will pay off in the long run. When we teach computer applications, it is done within the context of how to make the teacher's life more organized, ie. how to create grade rolls with a spreadsheet, manage student records with a database, and keep correspondence with a word processor.

Strategy 15: Make their personal lives easier.

In order to make computers more relevant to our students, we also teach them how to use these tools in their personal lives. They are shown how to use a word processor to write a resume, a spreadsheet to keep a budget, and a database to make an address book. Students are introduced to simple graphics programs which allow them to make greeting cards, signs, banners, calendars and other items for use in their personal lives.

Strategy 16: Introduce them to the whole gang.

Since our students will go in various directions following our courses, it is important that we expose them to as many different computer experiences as possible. One of their

major tasks is to evaluate educational software; therefore, we require that the students review titles several different computer formats (ie. MS-DOS, Windows, Macintosh and Apple II).

Strategy 17: Teach for both the artist and the scientist.

Many of our students begin with the impression that computers are primarily for math and science students who will become programmers or engineers. We stress the idea that computers are just as vital and useful for the artist as they are for the scientist. Drawing and paint programs are integrated into the curriculum, which allow the students to exercise creativity without restrictions. For the less artistically inclined, importing and modifying clip art and other graphic images provide the opportunity for creativity and fun.

Strategy 18: Use the computer for quizzing.

Quizzes for the course are given on the computer. In a session later on in the course, we explain the advantages of computerized quizzes (e.g. class time not taken up by quizzes, greater flexibility for test taking, less paperwork and grading time, etc.)

Strategy 19: Take a drive along the information highway.

We provide students with demonstrations of electronic mail and on-line computer services and encourage them to communicate with the professor and others using electronic mail and the interactive discussion groups on the Internet. Many students have friends at other universities and are excited to learn that they can send messages without the time constraints of postal delivery or high cost of long distance phone service. An ever increasing number of students are participating in interactive discussion groups on Internet, looking up information on Compuserve or Prodigy, accessing the library's catalogue via computer, or searching multimedia encyclopedias or ERIC on CD-ROM.

Strategy 20: Provide peers as lab assistants.

Another item that we have found to be critical in helping students reduce their computer anxiety and increase their confidence is ensuring that the assistants who help students in the computer lab are education majors who have been through our course. We have found that many lab assistants who are computer science majors tend to be intolerant of novice users who may feel fearful, uneasy or intimidated. Another problem is that they tend to do the task for the student, instead of instructing the students on how to complete the task. Lab assistants who are education majors are able to relate much better with their education peers in the lab and help the students to see the educational relevance of the assignments and activities.

Strategy 21: Bring in the kids.

A successful strategy has been to invite several elementary- and secondary-age students into the classroom and lab to demonstrate how to use some of the computer programs illustrated during the course. This gives the college students an opportunity to see how actual elementary and secondary students use these programs. In addition, we have found that many of our students become less anxious about learning the programs when they witness how easy they are for children to learn and operate.

Strategy 22: Teach them when to use technology.

It is important that we teach our students that technology is not an end unto itself. Any utilization of technology must be for the integration and enhancement of the curriculum. The primary question for the teacher considering technology should always be "Can this technology enhance the curriculum, facilitate learning and make teaching more effective?"

Conclusion

Educational technologists who train preservice teachers have an opportunity to have a far-reaching impact on the use of new technologies in schools. Computer technologies are now seen as playing an important role in the efforts to improve our educational system and teachers will be on the "front lines" of technology usage. Programs and initiatives that include the use of computer technologies in education as a component should consider seriously the issue of teachers' computer anxiety and confidence. By incorporating strategies to lessen computer anxiety and increase computer confidence, teacher educators and teacher preparation programs could play a vital role in helping to shape the future of our educational system.

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